We claim:

1. A magnetically shielded assembly comprised of a medical device implanted in a biological organism, wherein said medical device is disposed near biological tissue, wherein said magnetically shielded assembly is comprised of a magnetic shield disposed on at least a portion of said medical device, wherein said magnetic shield is comprised of a layer comprised of nanomagnetic material, and wherein:

(a) said layer comprised of nanomagnetic material has a thickness of at least about 150 nanometers and a morphological density of at least about 98 percent;

(b) said nanomagnetic material has a saturation magnetization of from about 1 to about 36,000 Gauss, a coercive force of from about 0.01 to about 5,000 Oersteds, and a relative magnetic permeability of from about 1 to about 500,000, and an average particle size of less than about 100 nanometers; and

(c) an interlayer is disposed between said layer comprised of nanomagnetic material and said medical device, wherein said interlayer has a thickness of less than about 10 nanometers and is comprised of a heterogeneous mixture of atoms that differs from the mixture of atoms present in said medical device, and also differs from the mixture of atoms present in said layer comprised nanomagnetic material..

2. The magnetically shielded assembly as recited in claim 1, wherein said layer comprised of nanomagnetic material has an average surface roughness of less than 100 nanometers.

3. The magnetically shielded assembly as recited in claim 2, wherein said interlayer has a thickness of less than about 5 nanometers and is comprised from about 40 to about 60

mole percent of atoms present in said medical device, and from about 40 to about 60 mole percent of atoms present in said layer comprised of nanomagnetic material.

4. The magnetically shielded assembly as recited in claim 3, wherein said medical device comprises at least 90 mole percent of niobium atoms.

5. The magnetically shielded substrate as recited in claim 4, wherein said medical device comprises less than about 10 mole percent of zironcium atoms.

6. The magnetically shielded assembly as recited in claim 3, wherein said medical device comprises nickel atoms.

7. The magnetically shielded assembly as recited in claim 6, wherein said medical device comprises titanium atoms.

8. The magnetically shielded assembly as recited in claim 7, wherein said medical device is comprised of from about 50 to about 60 mole percent of nickel.

9. The magnetically shielded assembly as recited in claim 3, wherein said medical device is comprised of a memory alloy.

10. The magnetically shielded assembly as recited in claim 3, wherein said medical comprises titanium atoms.

11. The magnetically shielded assembly as recited in claim 3, wherein said layer of nanomagnetic material has a magnetic susceptibility of from about 1 x 10^{-6} centimeter-gram seconds at a temperature at or about 293 degrees Kelvin, to about 1 x 10^{6} centimeter-gram seconds at a temperature at or about 293 degrees Kelvin.

12. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material has a saturation magnetization of from about 500 to about 10,000 Gauss.

13. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of nanomagnetic material has a thickness of less than about 2 microns.

14. The magnetically shielded assembly as recited in claim 13, wherein said nanomagnetic material has a saturation magnetization in excess of 20,000 Gauss.

15. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material is comprised of atoms selected from the group consisting of iron atoms, cobalt atoms, nickel atoms, gadolinium atoms, samarium atoms, and mixtures thereof

16. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material has a coercive force of from about 0.01 to about 3,000 Oersteds.

17. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material has a coercive force of from about 0.1 to about 10 Oersteds.

18. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material has a relative magnetic permeability of from about 1.5 to about 260,000.

19. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material has a relative magnetic permeability of from about 1.5 to about 2,000.

20. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material is disposed within an insulating matrix.

21. The magnetically shielded assembly as recited in claim 2, wherein, when said magnetically shielded assembly is tested in accordance with A.S.T.M. Standard Test 2182-02, it has a heat shielding factor of at least 0.3.

22. The magnetically shielded assembly as recited in claim 2, wherein said assembly further comprises antithrombogenic material.

23. The magnetically shielded assembly as recited in claim 2, wherein said nanomagnetic material is comprised of iron-containing magnetic material.

24. The magnetically shielded assembly as recited in claim 14, wherein said iron-containing magnetic material is selected from the group consisting of FeAl material, FeAlN material, FeAl0 material, and mixtures thereof.

25. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of a conductor with a resistivity at 20 degrees Centigrade of from about 1 to about 100-microohm-centimeters.

26. The magnetically shielded assembly as recited in claim 25 wherein said conductor has a bend radius of less than 2 centimeters.

27. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a stent comprised of wire mesh.

28. The magnetically shielded assembly as recited in claim 27, wherein said layer comprised of nanomagnetic material is contiguous with said wire mesh.

29. The magnetically shielded assembly as recited in claim 28, wherein said nanomagnetic material has an average particle size of less than about 20 microns.

30. The magnetically shielded assembly as recited in claim 2, wherein said medical device has a cylindrical shape.

31. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a catheter assembly.

32. The magnetically shielded assembly as recited in claim 2, wherein said medical

device is a guide wire assembly.

33. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a self-expanding stent.

34. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a biopsy probe assembly.

35. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a flexible tube endoscope assembly.

36. The magnetically shielded assembly as recited in claim 2, wherein a sheath assembly is disposed over said medical device.

37. The magnetically shielded assembly as recited in claim 36, wherein said sheath is comprised of a tearable seam.

38. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of a multiple strand conductor.

39. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of a multifilar coiled conductor.

40. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of a monofilar conductor.

41. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of an electrode.

42. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of nanomagnetic material has a tensile modulus of elasticity of at least about 15×10^6 pounds per square inch.

43. The magnetically shielded assembly as recited in claim 2, wherein said medical

device is a steerable guide wire.

44. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a transesophageal medical lead.

45. The magnetically shielded assembly as recited in claim 2, wherein said medical device is comprised of a braided wire mesh assembly.

46. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of said nanomagentic material has a morphological density of at least about 99.5 percent.

47. The magnetically shielded assembly as recited in claim 46, wherein said layer comprised of nanomagnetic material has an average surface roughness of less than about 10 nanometers.

48. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of nanomagnetic material is hydrophobic.

49. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of nanomagnetic material is hydrophilic.

50. The magnetically shielded assembly as recited in claim 2, wherein said medical device is operatively connected to an electrical circuit.

51. The magnetically shielded assembly as recited in claim 50, wherein said electrical circuit is a filter circuit.

52. The magnetically shielded assembly as recited in claim 51, wherein said filter circuit is comprised of an inductor.

53. The magnetically shielded assembly as recited in claim 52, wherein said filter circuit is comprised of a capacitor.

54. The magnetically shielded assembly as recited in claim 53, wherein said filter circuit is comprised of a resistive load.

55. The magnetically shielded assembly as recited in claim 54, wherein said resistive load is comprised of a thermoelectric cooling device.

56. The magnetically shielded assembly as recited in claim 54, wherein said filter circuit is comprised of a tank circuit.

57. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a pacemaker.

58. The magnetically shielded assembly as recited in claim 2, wherein said medical device is a defibrillator.

59. The magnetically shielded assembly as recited in claim 2, wherein said layer comprised of nanomagnetic material is comprised of at least about 30 weight percent of said nanomagnetic material.

60. The magnetically shielded assembly as recited in claim 2, wherein said magnetic shield is comprised of a substrate, and wherein said substrate is comprised of a top surface and a bottom surface and a multiplicity of openings extending from said top surface to said bottom surface.

61. The magnetically shielded assembly as recited in claim 61, wherein said layer comprised of nanomagnetic material is disposed over said substrate.

62. The magnetically shielded assembly as recited in claim 61., wherein said nanomagnetic material has an average particle size of less than about 20 nanometers.

63. The magnetically shielded assembly as recited in claim 62, wherein said nanomagnetic material has a saturation magnetization of from about 10,000 to about

26,000 Gauss.

64.. The magnetically shielded assembly as recited in claim 63, wherein said layer comprised of nanomagnetic material has a thickness of from about 500 to about 1,000 nanometers.

65. The magnetically shielded assembly as recited in claim 64,wherein said layer of nanomagnetic material is comprised of electrical circuitry.

66. The magnetically shielded assembly as recited in claim 65, wherein said electrical circuitry is adapted to limit current flow through biological tissue.

67. The magnetically shielded assembly as recited in claim65, , wherein said electrical circuitry is adapted to limit current flow through said medical device.

68. The magnetically shielded assembly as recited in claim 2, wherein said magnetic shield is comprised of a layer of nanoelectrical material disposed around said layer of nanomagnetic material, wherein: said layer of nanoelectrical material has a thickness of from about 0.5 to about 2 microns and a resistivity of from about 1 to about 100 microohm-centimeters.

69. The magnetically shielded assembly as recited in claim 2, wherein said magnetic shield is comprised of a layer of nanothermal material disposed around said layer comprised of nanomagnetic material, wherein said layer of nanothermal material has a thermal conductivity of at least about 150 watts/meter-degree Kelvin and a resistivity of at least about 10^{10} microohm-centimeters.